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## **METHOD OF ANTI-POLLUTION FOR EXHAUST AND APPARATUS THEREOF**

### **BACKGROUND OF THE INVENTION**

#### **1. Field of The Invention:**

The present invention relates to a method of anti-pollution for exhaust and  
5 apparatus thereof. In particular, the present invention relates to a method for  
eliminating or separating suspended particles in the exhaust and an apparatus to  
perform the method.

#### **2. Description of Related Art:**

The exhaust, especially the exhaust after combustion, being discharged to  
10 the open air often is a struggled issue with regard to the environment protection.  
The exhaust produced by the burned fuel basically is aggregation of micro particles  
regardless the fuel is oil fuel or coal. If the micro particles are discharged in the  
atmosphere, it is natural that the environment becomes polluted. Hence, to solve  
the problem caused by the contamination source of the discharged exhaust is a  
15 subject we always care about. Especially, the exhaust generated from the diesel oil  
or the heavy oil is extremely shocked at the sight of us.

In order to solve the problem of exhaust contamination, the supplier of the  
technique dealing with environment protection have developed various anti-  
pollution methods or apparatuses associated with different techniques. However,  
20 although each technique has its advantages, it still exists disadvantages also. A  
brief summary for their advantages and disadvantages are listed hereinafter:

1. The electrostatic precipitator (E/P) type dust collector is used for  
collecting suspended micro particles and it offers good effect but it is too expensive  
and the size thereof is too huge.

25 2. The bag filter type dust collector can filter micro suspended particles but  
it is unable to endure the high temperature so that it is impossible to treat the

glutinous matter. Further, the filter net is expensive so that the anti-pollution cost has be higher.

3. The cyclone type dust collector is lower in price but the treatment efficiency is not high. Especially, it is not possible for the cyclone type dust collector to collect the suspended particles with smaller sizes.

4. The water spray ( wash ) type dust collector provides a lower cost but the wastewater may result in a problem of second pollution.

5. The cordierite ceramic filter core offers an excellent filtering effect but it is only possible to treat a small amount of exhaust. Further, the ceramics is fragile and expensive.

#### **SUMMARY OF THE INVENTION**

The crux of the present invention resides in the fact that a method of anti-pollution for exhaust and a apparatus thereof, which provides a closed housing filled with filter materials and clearances between the filter materials for being passed through the exhaust and the suspended particles in the exhaust can be filtered out. A discharge part of the exhaust is connected to an inlet hole disposed at an end of the housing and an outlet hole is disposed at another end of the housing for guiding the treated exhaust out. The exhaust is guided into the housing and a plurality of contaminating particles in the exhaust are left in the housing and the pollution resulting from the treated exhaust can be reduced greatly before being guided out from the housing.

#### **BRIEF DESCRIPTION OF THE DRAWINGS**

The present invention can be more fully understood by reference to the following description and accompanying drawings, in which:

Fig. 1 is a perspective view of a single dust collection box according to the present invention;

Fig. 2 is a sectional view of collection box of the present invention illustrating shields being added; and

Fig. 3 is an exploded perspective view of box net type dust collection according to the present invention.

## 5     **DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS**

Basically, a principle of the present invention resides in that dust collection material is utilized to hinder and/or to adsorb particles in the exhaust such that the fine particles can stagnate due to collision, viscosity, or static electricity and can be adsorbed by the collection material or fall down due to the gravity. Hence, the contamination of the exhaust can be removed and the polluted particles can be separated and collected for further treatment.

Referring to Fig. 1, an anti-polluted apparatus for exhaust according to the present invention comprises a housing 1, an inlet hole 2, an outlet hole 3 and filter material 4.

Wherein, the housing 1 has a closed shape with an inner filtering chamber 11 for receiving filter material, and the inlet hole 2 and the outlet hole 3 are disposed at the wall of the housing. The housing 1 can be provided with a shape of cylinder, rectangular parallelepiped and etc. and at the bottom thereof may provide an infundibuliform dust collection hole 12 for discharging polluted particles.

The inlet hole 2 is disposed at the housing 1 to communicate with the interior of the housing 1 and the purpose of the inlet hole 2 is for connecting with the discharge pipe of the exhaust so that an inlet pipe 21 can be extended from the inlet hole 2 to join the discharge pipe.

The outlet hole 3 is disposed at the housing 1 to communicate with the housing 1 and the purpose of the outlet hole 3 is for discharging the filtered exhaust so that an outlet pipe 31 can be extended from the outlet hole 3 for guiding the treated exhaust out.

The filter material 4 is used for colliding with and/or adsorbing the particles in the exhaust so that it can be an aggregation of a plurality of particle shaped filtering elements, be composed of multi-layer filtering grids, or be a combination of particle filtering elements and the filtering grids. In case of the filter material being an aggregation of particle shaped filtering elements, the particle shaped filtering elements are packed with clearances between particle filtering elements for being passed by the exhaust and the particle filtering elements can be made of fiber, stone, pottery, porcelain, ceramics, metal or resin. The filter material 4 can be aggregated with particle filtering elements with identical material or two or more different materials and each of the filtering element can provided with a shape of ball, cube, rectangular parallelepiped or any other irregular shape. In addition, a better effect can be obtained if the outer surface of each filtering element is treated with catalyst convert agent.

In practice, place anti-pollution bags, which are filled with the aggregated filter material, into the filtering chamber 11 in the housing 1 and the inlet hole 2 is connected to the exhaust discharge port before the exhaust can be filtered. Then, the exhaust is forced to enter the filtering chamber 11 by way of wind pressure and the contaminating particles accompanying the exhaust can stain onto the filter material 4 or slow down the velocity thereof due to collision. The contaminating particles may fall down to the bottom because of energy loss after multiple collisions and the fallen contaminating particles are discharged via the collection hole 12.

In order to prove the effectiveness of the present invention, an explanatory example as shown in Fig. 2 illustrates a windmill A connects with a 1" exhaust pipe B with the blast volume 0.5m<sup>3</sup> /min and a temperature of 27°C and the flour serves as simulated suspension particles. A housing with a 120mm (W) \* 120mm (L) \* 180mm (H) dust collection trough contains the filter material, which is a mixture of filtering elements with grain sizes in a range of 1mm ~ 10mm. As soon as the windmill is starts, 80 grams of flour are sprayed into the windpipe in front of the dust

collection trough. Once the windmill is stopped, the flour collected at the bottom of the dust collection trough is 65 grams. It means that the dust collecting efficiency is 81%, that is, 80 percentages of the suspended micro particles can be removed.

Referring to Fig. 2 again, the filtering chamber 11 in the housing 1 is attached with one or more non-completely closed partitions 13 as shields to perform multiple filtrations such that contaminating particles in the exhaust can be removed effectively.

If the surface of the filter material 4 is provided with catalyst convert agent such as platinum, palladium, germanium or rare earth element, the effect for removing HC, CO, NO and PM (SOOT) can be enhanced greatly.

Because the housing is filled with the filter material 4, it is possible to occur problems such as excessive pressure and temperature rise. The relief valve and the temperature controller can be added to the housing to relieve the pressure and to lower the temperature in the housing 1. The technique related to the pressure relief and the temperature reduction is prior art so that no detail will be described further. Meanwhile, a conventional muffler and/or turbulent or ash blowing device may be added to the pollution prevented device of the present invention to eliminate the noise and to collect the contaminated particle within the turbulence.

It is appreciated from the preceding embodiment that the present invention can hinder and stagnate the contaminating particles in the exhaust by way of the filter material while the exhaust passes through the filtering chamber in the housing so that the exhaust discharged from the anti-pollution device of the present invention can reduce the pollution gradients thereof to the environment. Further, the filtering material can be replaced or cleaned at regular time to keep the anti-pollution device of the present invention in a good condition. The set up cost and the operation cost for the anti-pollution device of the present invention are low so that it is capable of being utilized in industries such as treating the exhaust of a car.

These advantages of the invention are not possible for the conventional anti-pollution device can reach effectively.

While the invention has been described with reference to the preferred embodiment thereof, it is to be understood that modifications or variations may be easily made without departing from the spirit of this invention, which is defined by the appended claims.

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